THE EFFECTIVENESS OF AIDS EDUCATIONAL PROGRAMS FOR INTRAVENOUS DRUG USERS

Don C. Des Jarlais, Ph.D.

March 1988

Contractor Document
Health Program, Office of Technology Assessment
U.S. Congress, Washington, DC 20510-8025

This paper was prepared by an outside contractor for the OTA staff paper *How Effective is AIDS Education?* The paper does not necessarily reflect the analytical findings of OTA or the Technology Assessment Board.

J952-112

INTRODUCTION

The purpose of this paper is to examine the potential effectiveness of "educational" programs for preventing the spread of human immunodeficiency virus (HIV), the virus that causes AIDS among IV drug users. IV drug users are the second largest group of persons who have developed AIDS in the United States and western Europe. They are important for the future spread of HIV because of the large numbers who are already infected, and the large numbers not currently infected but at high risk of infection through sharing drug injection equipment with those who are. They are also critical to the future of the epidemic because intravenous drug users are the predominant source of heterosexual and perinatal transmission of HIV in the U.S. and western Europe. If heterosexual transmission of HIV does become self- sustaining in the U.S. and western Europe, it will likely be through IV drug users serving as the initial reservoir for transmission to the heterosexual non-drug injecting population.

A CONCEPTUAL FRAMEWORK FOR AIDS PREVENTION AMONG INTRAVENOUS DRUG USERS

In considering the potential effectiveness of "educational programs" for the prevention of AIDS among intravenous drug users, the logical beginning point is a definition of what constitutes an "educational program." There is a consensus in the AIDS field that, given the absence of both a vaccine and a cure for AIDS, "education" is the only method for controlling the epidemic. What is meant by "education" when the term is used in this manner is rarely specified. The term implies some form of cognitive knowledge that is to be imparted to some "target" group, with the intention of provoking some þorm of behavior change in the target group. Beyond the modes of transmission of HIV,

the cognitive knowledge is usually not specified, and there is frequently great disagreement on the desired behavior changes to be produced. ("Safer" sex with condom use versus lifetime monagamy is a common point of contention among persons who advocate AIDS education.) In addition to tbese disagreements over the behavioral endpoints, matters of how the cognitive information is to produce the new behavioral patterns are typically not addressed.

For the purposes of this paper, I will consider AIDS eduation programs for IV drug users to include necessarily three components: 1) information that people continuing the pattern of sharing drug injection equipment that existed in the IV drug use subculture prior to the introduction of HIV will now risk developing AIDS, 2) means for adopting new behaviors to utilize this information, and 3) reinforcement for the new behaviors. This conceptualization of education goes well beyond the imparting of cognitive information that typifies many AIDS "educational" efforts. This type of educational program emphasizes the potential inadequacy of merely imparting new information. This formulation requires that the "educator" not only successfully impart new information, but also provide the means for acting upon the information, and then reinforcing the new behavior patterns that are based on both the new information and the means for acting upon that information.

This tripartite formulation clearly involves a higher standard than simply imparting information. In order to understand how "AIDS education" of this type might lead to reduction in the spread of HIV among intravenous drug users, it is helpful to start with a brief description of the varied reasons why drug injection equipment was shared prior to the introduction of HIV. (For a more detailed description, see Des Jarlais, Friedman, and Strug, 1986.)

Sharing of Injection Equipment Prior to AIDS

Although there is a common image of IV drug users as loners, most IV drug use is a highly social activity, and the social nature of the activity is one of the primary factors that has led to frequent sharing of injection equipment. Initiation into IV drug use, in particular, is a result of social interactions with admired friends. (For many women being initiated into drug injection, the relationship with the more experienced user may be sexual rather than just friendship.) The new user has to be taught the proper drug preparation and injection techniques, and because of the natural reluctance to pierce one's skin with a needle, usually has someone else actually perform the first injeotion. The actual invitation to inject will typically be made on the spur of the moment rather than being planned in advance. The unplanned nature of the first injection makes it extremely rare for a person to have his or her own injection equipment for the first time. Learning to inject drugs thus typically takes place in a setting in which the sharinq of the drug injection equipment among friends is considered a normal part of injecting. The sharing is integrated with the ritual aspects of the drug use and serves to facilitate the social bonding within the group.

As drug injectors move from initiation to regular use they will usually obtain their own equipment and loosen their ties with the first group of friends who initiated them into drug injection. There still will be frequent sharing based on close personal bonds. Obtaining money for drugs, obtaining the drugs, and finding the equipment for injecting and a location in which one can safely inject the drugs can be difficult and often dangerous tasks. Small groups or pairs of drug users will often pool their efforts for these tasks. The pooled efforts are often much more successful than what the individuals could accomplish on their own. Working within a small group also provides for

assistance--even lending of drugs or money--when an individual might otherwise not be able to obtain drugs. The high level of violence in the illegal drug distribution system also reinforces the need for cooperation within pairs or small groups. Sharing among "running buddies" or between sexual partners serves to reinforce the sense of successful cooperation within a hostile environment. Within close interpersonal relationships, it may be a misnomer to speak of "sharing" of injection equipment. If the equipment is considered to be jointly owned, then use by the joint owners would not necessarily be thought of as "sharing" of the equipment.

Not all sharing of drug injection equipment is based on maintaining close interpersonal relationships among IV drug users. Some is purely pragmatic. Injection equipment can be a scarce resource for IV drug users. Most states with large numbers of IV drug users have deliberately created scarcity by requiring prescriptions for the sale of needles and syringea. Even in the majority of states that do not require prescriptions, many pharmaciats will not sell needles and syringes to persons suspected of being IV drug users, and many IV drug users do not want to purchase needles and syringes because it may involve losing the confidentiality regarding their drug use.

Even if a drug user has obtained his or her own injection equipment, there are practical reasons for not carrying the equipment. IV drug users by definition will be engaged in illegal activities. The possession of the drugs to be injected is illegal, even if the means for obtaining the money to purchase the drugs were legal. In many places simple possession of drug injection equipment is in itself a criminal offense, and where it is not a criminal offense, it can still serve as information to the police that the person is almost undoubtedly engaged in illegal activities. Rather than

carrying injection equipment around as the drug user goes about obtaining drugs, the (pre-AIDS) standard operating procedure was to obtain the drugs first, and then worry about obtaining the injection equipment.

After an IV drug user has obtained drugs, he or she will typically want to inject as soon as possible. If the drug user should be in withdrawal prior to obtaining the drugs, the desire to use the drugs as soon as possible will be particularly intense. Although withdrawal from heroin, cocaine or amphetamines is not life-threatening, it can be extremely distressful psychologically, and, for heroin, physically. The drug user knows that use of the drug will almost instantaneously relieve the withdrawal distress, and so is highly motivated to use the drug immediately. Interestingly, the mere possession of heroin can provoke withdrawal symptons in a heroin addict who is not currently addicted and thus should not suffer from withdrawal. This appears to occur through a Pavlovian conditioning procedure in which the possession of the drug sets off a conditioned reflex that is counter to the standard effects of the drug (Wikler, 1973).

The illicit drug distribution system provides several ways in which an IV drug user can inject very soon after obtaining his or her drugs. Some drug dealers, particularly in cities with relatively few IV drug users, will keep an extra set of needle and syringe to lend to their customers. In cities with large numbers of IV drug users, "shooting galleries" will often develop in the same areas in which the drugs are sold. These are locations that provide the drug user with a semi-private space and water for injecting and will rent and/or sell the equipment needed for injecting. A small charge is collected for the use of the space and water, and for rental of the equipment. When new injection equipment is available for sale, it will be sold at a higher price than that charged for the rental of used equipment.

A single needle and syringe can often be used by scores of drug users before the needle becomes too worn for further use. Both the drug injection equipment among large numbers of IV drug users and for sharing of equipment across friendship groups. The use of shooting galleries has been linked to HIV exposure in several studies of IV drug users (Marmor, et al., 1987A; Schoenbaum, et al., 1986; Chaisson, personal communication, 1987).

Sharing of drug injection equipment--prior to AIDS--was done for many reasons. It occurred because it was part of the way in which IV drug users were initiated into the group, because it symbolized positive social relationships among IV drug users, and because it was often much more practical that everyone attempting to always have personal equipment for injecting. AIDS threatens to undermine these multiple and often overlapping reasons for sharing drug injection equipment. Rather than symbolizing interpersonal solidarity, the sharing of equipment may soon symbolire a direct and fatal threat to the health of the partner. Although sharing may still be pragmatic on a short term basis, on a long-term basis, it may be the ultimate in impracticality.

A Cognitive/Behavioral Analysis of AIDS Risk Reduction

Because of the multiple reasons for the sharing of drug injection equipment in the pre-AIDS era, an extended formulation of AIDS "education" programs for IV drug users will be needed for assessing the potential effectiveness of those efforts. As noted above, a three component cognitive/behavioral formulation of AIDS education will be used.

The first component is imparting cognitive knowledge about AIDS to IV drug users. That the AIDS virus is tranamitted through the sharing of drug injection equipment, through homosexual and heterosexual activity, and

perinatally to the fetus, is the fundamental starting point for this information. This information can be and is readily conveyed in posters, pamphlets, radio and televsion announcements, and through word of mouth in the oral communication networks of the drug subculture. Much more than information is needed, however, before large numbers of IV drug users can be expected to successfully change their behavior in order to reduce the chances of being exposed to HIV.

One important additional piece of information is the extent to which the AIDS virus has entered a local community of IV drug users. Clearly there is little need to reduce sharing drug injection equipment if there are no IV drug users in the area who have been exposed to HIV.

Information concerning the long-time asymptomatic carrier status is also needed. With most infections, the carrier status is relatively short and the time between initial exposure and development of the diseaee is also relatively short. With many fatal diseases it is also possible to note that the person is ill simply by a first glance observation. The severe weight loss and debilitation associated with full blown AIDS does make identification of many IV drug users with AIDS relatively easy through casual observation. These "common sense" ideas about infectious diseases have been applied to AIDS by many IV drug users, leading them to believe that as long aa they are not sharing drug injection equipment with people who "look sick" they can protect themselves against AIDS.

Another area of complex information related to the asymptomatic carrier state is the likelihood of developing AIDS after exposure to HIV. If an IV drug user believes that there is a very low likelihood of developing AIDS after HIV exposure, then motivation to change behavior is not likely to be very strong. Conversely, the belief that all persons exposed to HIV will

develop AIDS (and die from it), or the belief that exposure to HIV is the same as having AIDS, may create such anxiety that "rational" risk reduction efforts are undermined.

The probabilistic nature of transmission through sharing of drug injection equipment or sexual activity is another complex area of AIDS information. There is a tendency among IV drug users--as well as among the general public--to believe that a single act of sharing drug injection equipment or sexual intercourse with an HIV-infected person has a high probability of transmitting the virus. This can lead to a defeatist attitude in which IV drug users who have shared injection equipment with a friend who developed AIDS mistakenly assume that they must be infected and that any risk reduction efforts are too late.

These additional kinds of information go well beyond what can be readily conveyed through mass media announcements, posters and pamphlets. It involves revision of some common sense ideas about infectious diseases, and conceptually difficult considerations of probability. This level of "education" also involves integration of the cognitive information with the individual histories of risk behavior and the emotions of the IV drug user. Information about the presence of the virus in the geographic area will affect the sense of vulnerability of the IV drug user. Information about an asymptomatic carrier state will relate to concerns that friends of the IV drug user are already infected, that he or she is already infected, and that he or she may have already infected others.

The complexity and emotional aspect of this additional information make it unlikely that there will be any simple relationship between "learning" this information and changes in behavior. It is unlikely that the IV drug user will learn exactly what the AIDS educator expects him or her to learn and that the

most desired level of emotional arousal for behavior change will be attained. Face-to-face interaction in which the IV drug user can ask clarifying questions and the educator can modulate the emotional tone of the presentation may be needed to improve the probability that the content of the ducational session will lead toward the behavior changes desired by the educator.

Means for AIDS Risk Reduction among IV Drug Users

The imparting of cognitive information and the integration of that information with emotions so that the IV drug user is motivated to reduce his or her risk of developing AIDS cannot be considered the end point for successful AIDS education. If the IV drug user is to change his or her behavior to reduce the chances of developing AIDS, then the question of the means for making those changes must also be addressed within the context of the AIDS educational efforts.

A socially desirable outcome of AIDS education would be for the IV drug user to stop injecting illicit drugs. Ceasing to inject drugs not only is the most likely method of avoiding AIDS for an IV drug user, but also would reduce the other psychological, health, and social problems associated with illicit drug injection. For persons with histories of intensive drug injection, who are at highest risk for infection with HIV, however, ceasing to inject illicit drugs is not simply a matter of forming the "right" intentions or of the "strength" of those intentions. There are, however, some instances of addicted IV drug users ceasing to inject drugs without any formal treatment, although most of these required strong social support systems for their efforts (Biernachi, 1986).

More likely, for persons with histories of intensive drug injection, ceasing to inject drugs will require formal treatment. The relationships between AIDS education and the seeking of treatment by IV drug users will be

examined below, although a review of the effectiveness of treatment programs in reducing and/or eliminating IV drug use is beyond the scope of this paper. (For the results of a large scale study of treatment outcomes, see Simpson, et al., 1978). There is general consensus within the drug abuse field that entry into treatment is often associated with immediate reductions in IV drug use, that retention in treatment is associated with significant reductions that are maintained over long periods of time, but that a single episode of treatment is not likely by itself to lead to permanent cessation of IV drug use. For the purposes of this paper, it is important to note that one potential outcome of AIDS educational programs is for IV drug users to seek treatment for their drug use, and without treatment, even short-term reductions in drug use may be difficult to achieve. Thus, the effectiveness of many AIDS education efforts may depend upon the availability of suitable drug abuse treatment.

AIDS education efforts will not necessarily lead all IV drug users to seek treatment to reduce their drug injection, not all those who seek treatment will be admitted, and treatment will not be immediately effective for all of those who do enter it. AIDS education efforts for IV drug users must thus consider the inevitability that a substantial percentage of IV drug users will continue to inject drugs for at least the short-term future. Assuming that the education efforts have imparted basic knowledge about AIDS and the motivation to avoid developing HIV infection, means for AIDS "safe" (or, more properly "safer") injection must be addressed. There are a variety of ways in which AIDS education programs can provide the means for safer injection, from exhortations not to share equipment when injecting, to providing information on how to sterilize previously used injection equipment, to providing bleach or alcohol for de-contaminating used equipment, or to actually providing sterile equipment for injecting drugs. Teaching social

skills and strategies for refusing to share equipment are an additional aspect of providing for safer injection. The ready accessibility of means for safer injection, especially when an IV drug user is entering withdrawal, may be the critical factor in the effectiveness of this component of AIDS education programs for IV drug users.

As noted above, it has been the common policy in the United States to limit legal access to sterile injection equipment and/or to make possession of "narcotics paraphernalia" a crime in an attempt to limit the extent of illicit IV drug use. There is no convincing evidence that these policies have had the effect of limiting IV drug use, but, nonetheless, there is a common belief that providing the means for "safer" injections may lead to increased IV drug use. Nevertheless, a desire by many IV drug users to protect themselves against HIV infection while continuing to inject drugs is a likely outcome of increased information about AIDS. The educational program must then address the question of the extent to which it will provide means for acting on this desire for safer injection. The limited data on the effectiveness of providing means for safer injection as part of AIDS education and the relationship between providing means and increasing/reducing IV drug use will be examined below.

Reinforcing Risk Reduction Behavior

The final component of this cognitive/behavioral analysis of AIDS prevention for IV drug users consists of reinforcing the risk reduction behavior. Given the many reasons for the sharing of injection equipment in the pre-AIDS era, it would be a major error to assume that new behaviors that avoid/reduce the sharing of injection equipment would automatically be sufficiently reinforcing for maintenance of the behavior over time.

With respect to treatment to eliminate drug injection, the new injection-free life style would have to provide more reinforcement than the previous drug-use life style in order for the AIDS risk reduction to be maintained over time. Again, a review of the effectiveness of drug abuse treatment is beyond the scope of this paper, but a few comments on how the major treatment modalities try to reduce the immediate reinforcement value of further drug injection are appropriate. In therapeutic community treatment, the former IV drug user spends one to two years in a residential setting in which there is very close observation of his or her behavior. Thus, any drug use is very likely to be detected and followed by certain punishment. The punishment includes loss of privileges, assignment to menial labor tasks, and loss of respect among peers and the program staff. During the time in treatment, the resident is re-socialized to develop more competence and greater pleasures in a drug-free lifestyle. In classic methadone maintenance programs, the daily medication is sufficient to induce a cross-tolerance, so that injection of heroin will not produce any euphoric-reinforcing effect. As long as the patient is taking the methadone medication at a sufficient level, the patient will cease injecting heroin because it does not produce a pleasurable effect. Thus protected against the effects of illicit narcotics, the patient is then also able to develop a rewarding life without heroin injection. (Methadone programs aloe utilize urinalysis surveillance in order to monitor whether patients are complying with the medication schedule and whether they are using a variety of illicit drugs.)

The belief that an IV drug user is successfully protecting him or herself against developing AIDS is, of course, a potentially powerful cognitive reinforcement for new behavior. There are several restrictions that make this type of cognitive reinforcement difficult. The IV drug user must

believe that the threat of HIV infection is personally real, but that he or she has not yet been infected, and that the action being taken makes a significant difference in the likelihood that he or she will become infected. Given the exigencies of daily life for an IV drug user, it is unlikely that the new risk reduction behavior can always be maintained. Thus, there must also be an additional belief that the occasional slip in risk reduction behavior does not negate the need for continuing risk reduction.

There is emerging evidence that this type of health belief system can serve as a cognitive self-reinforcement mechanism to maintain risk reduction in both gay men (Coates, et al., 1988) and IV drug users (Senie, et al., 1987). There are dangers, however, in relying upon this type of belief structure as the primary way of reinforcing AIDS risk reduction. There are clear contradictory tendencies in the beliefs related to this form of cognitive self-reinforcement. A high infection rate among IV drug users in the local area would serve to increase the sense of perceived danger and potentially increase the reinforcement value of risk reduction. A high infection rate also increases the chances that an individual IV drug user would be infected prior to beginning risk reduction, and that a single lapse in risk reduction would lead to infection, both of which would undermine the cognitive self-reinforcement. Uncertainties in just how safe various forms of "safer" injection and/or "safer" sex might be also undermine cognitive self-reinforcement. Very safe forms of risk reduction, e.g., abstinence, would be highly reinforcing, but would form a greater contrast with any lapse in risk reduction. A lapse would thus be seen as more serious, and would more likely lead to abandoning risk reduction.

Given the complexity and potentially contradictory tendencies in the belief structure for cognitive self-reinforcement of risk reduction, successful AIDS education programs probably will have to include other methods

for reinforcing risk reduction. Peer approval is a logical form for reinforcement of AIDS risk reduction among IV drug users. Peer approval is a strong part of initiation into IV drug use, was a major determinant of sharing injection equipment prior to AIDS, and is a major component of many drug abuse treatment programs.

Empirical data suggest that peer approval is an important part of AIDS risk reduction among IV drug users in New York City. Whether or not friends were practicing AIDS risk reduction was the strongest predictor in an early study of AIDS behavior change (Friedman, et al., 1987). Friends' behavior was a significantly stronger determinant of risk reduction than knowledge of AIDS, educational level, or whether the IV drug user personally knew someone who had developed AIDS. This finding suggests that the decisions to engage in AIDS risk reduction were made within a group context rather than by IV drug users as isolated individuals. One assumes that there was group discussion of the need for and best methods of risk reduction, modeling of the behavior change, and social approval that helped maintain the behavior change.

Full utilization of peer approval as a reinforcement mechanism for AIDS risk reduction among IV drug users would involve the formation of new norms within the IV drug use subculture. These new norms could take the form of all drug users' maintaining their own injection equipment, or all users' employing a new sterile needle and syringe each time they injected, or rituals for sterilizing injection equipment before injection.

The three component cognitive-behavior conceptualization of AIDS risk reduction among IV drug users developed here implies that the process of risk reduction is much more complex than would be assumed within a simple "educational" approach. The imparting of new information--the dangers of AIDS and how AIDS is transmitted--is only a first and not a sufficient step for

inducing risk reduction. Further steps of providing the means for behavior change and reinforcement for the maintenance of the new behavior must also be addressed. The formulation will be utilized to examine the limited number of studies of AIDS risk reduction and AIDS educational programs in the next section. In attempting to assess the "effectiveness" of any educational program, it will be important to determine how the specific program fits with pre-existing levels of AIDS knowledge, accessibility of means for behavior change, and mechanisms for reinforcing new behavior. This analysis will suggest that the limits on the effectiveness of specific AIDS educational programs may be more in what they are not providing rather than in any inability to impart AIDS information to IV drug users.

MAJOR STUDIES OF AIDS BEHAVIOR CHANGE AMONG IV DRUG USERS

Studies in New York City

The earliest cases of AIDS among IV drug users were noted in New York City and the earliest studies of AIDS risk reduction among IV drug users were also conducted in the city. The data in these studies were collected prior to any official AIDS education programs for IV drug users. The data illustrate both substantial behavior change in the absence of any official education programs and the need to assess the effectiveness of educational programs in relation to other developments in the IV drug use subculture.

In an ethnographic study conducted in the fall of 1983, New York IV drug users not in treatment already appeared to be well informed about AIDS (Des Jarlais, Friedman, and Strug, 1986). They had heard of the disease, knew that it was associated with homosexuals, and also knew that it was associated with injection of illicit drugs. They had learned about AIDS from the mass media and from the oral communication networks within the drug use subculture. They

reported that behavior change was occurring among IV drug users in the City, primarily in the form of trying to avoid the use of needles that others had previously used. They also expressed skepticism about maintaining the risk reduction when faced with withdrawal. A common statement was that, when in possession of drugs to inject and undergoing withdrawal, a drug user would use the first injection equipment that he or she could obtain.

Data collected from a questionnaire study of methadone patients in New York City in the summer of 1984 provided quantitative confirmation of these results (Friedman, et al., 1987). Fifty-nine methadone maintenance patients in Manhattan were interviewed about their knowledge of AIDS and whether they had done anything to reduce their risk of developing AIDS. Almost all reported that they knew of AIDS and 93 % reported that AIDS was transmitted through the sharing of drug injection equipment. Fifty-four per cent reported that they had made some change in their injection behavior in order to reduce their risks of developing AIDS. The most frequently reported changes were increasing their use of sterile needles/cleaning their needles more frequently, which was reported by 31%, and reducing the number of persons with whom they would share drug injection equipment, which was reported by 29%.

Very similar findings were obtained in a study conducted by Selwyn and colleagues in the Bronx during the spring of 1985 (Selwyn, et al., 1985). They interviewed 136 methadone patients and 115 persons who were undergoing narcotic detoxification in the city prison system. Essentially all of these subjects knew of AIDS and over 90% knew that it was transmitted through the sharing of drug injection equipment, there were no differences in knowledge between the methadone and the prison sample. Over 60% of both groups reported that they had changed their behavior in order to reduce their risk of AIDS. Stopping or decreasing needle sharing were the two most common methods of risk

reduction in both groups. Twenty- one per cent of the methadone group reported stopping drug injection, while only 2% of the jail detoxification group reported this as a means of risk reduction. Although there are some differences with respect to the method of risk reduction, these studies show great consistency with the reports by Friedman and colleagues that IV drug users in New York City knew about AIDS and that a majority of them had changed their behavior in order to reduce their chances of developing the disease. (Selwyn, et al., 1985).

Studies of the marketing of illicit sterile needles in New York City showed that there was increased demand for sterile injection equipment. In the spring of 1985, 22 persons selling illicit injection equipment were interviewed about their business (Des Jarlais, Friedman, and Hopkins, 1985). Eighteen (88%) reported that the demand for illicit sterile needles had increased over the past year. Over half of them reported that the demand for sterile needles was great enough that they had occasionally sold "counterfeit" sterile needles and syringes. They had taken used needles and syringes, washed them out, placed them in the original packages, used heat to reseal the package, and then sold it as new. These counterfeit sterile needles and syringe had never been observed in New York prior to the increased demand related to concerns about AIDS. In a second study of the marketing of illicit sterile needles in New York, dealers selling $25 and $50 bags of heroin were including "free" sterile needles as a marketing device to lure customers (Des Jarlais and Hopkins, 1985). This situation had not yet been observed prior to the AIDS epidemic, and is an additional indication of the increased demand for illicit sterile needles among IV drug users in New York.

These studies were conducted prior to any formal AIDS education programs for IV drug users in New York. They show widespread awareness of AIDS and knowledge that it is transmitted through the sharing of drug injection

equipment. They also show an increase in the means for risk reduction. The market in illicit drug injection equipment had responded to the increased demand. (This response was not perfect, in that some of the needles that were being sold as sterile actually had been previously used.)

As noted above, new norms regarding the sharing of drug injection equipment appear to be developing among some groups of IV drug users in the New York City. In the first study of methadone patients, risk reduction by the individual subject correlated 0.60 with reported risk reduction among his or her friends and acquaintances. Very few of these subjects were reporting AIDS risk reduction unless they believed that their friends were also practicing risk reduction. It is also noteworthy that the risk reduction was not correlated with knowledge about AIDS, indicating that more than knowledge may be required for risk reduction (Friedman, et al., 1987). These findings suggest that basic knowledge about AIDS had spread widely among IV drug users in the city, that the risk reduction efforts were occurring in small friendship groups rather than in isolated individuals, and that social support may be vital for maintaining AIDS risk reduction.

These New York studies illustrate the three components of the cognitive-behavioral formulation of AIDS risk reduction among IV drug users. The IV drug users studied in New York knew that AIDS was transmitted through the sharing of injection equipment, the illicit market in sterile injection equipment provided increased means for "safer" injection, and the individual's risk reduction was associated with social support.

Official AIDS risk reduction programs for IV drug users in New York have become operational since the above data were collected. The two main forms to date have been increasing the availability of treatment for IV drug use and using ex-addicts as AIDS educators for IV drug users not in treatment.

Since the AIDS epidemic began, approximately 3000 new permanent treatment positions have been added to the drug abuse treatment system in New York. As of November, 1988 all of these positions have been filled, and there is still a waiting list of approximately 1000 persons who have applied for treatment. Current plans call for an additional 5000 treatment positions to be opened over the next year and a half. These treatment positions should provide additional means for IV drug users to change their injection behavior.

In addition to the added treatment positions, two groups are currently conducting outreach AIDS education for IV drug users not in treatment in New York City. (Although the above studies indicate that IV drug users in the City are fully aware of AIDS and know that it is transmitted through the sharing of drug injection equipment, further AIDS education is needed with respect to certain areas of information. Specific areas of misinformation/lack of information include how to sterilize drug injection equipment properly, specifics of heterosexual transmission and "safer" heterosexual procedures, the fact that one cannot tell who is infected by whether they "look sick," and lack of casual contact transmission.)

One of these groups, ADAPT, is an organization formed primarily by ex-addicts to conduct street based AIDS education. This group operated on a volunteer basis for almost two years, and has recently received City funding. The second group is operated by Narcotic and Drug Research, Inc., a not-for-profit organization. This organization has been conducting street outreach for the past year under a contract with the State Department of Health. Both groups utilize ex-addicts who go into the high drug use areas of the city--including into shooting galleries--and conduct face- to-face AIDS education. The face-to-face situation permits communication of more detailed information than could be communicated through mass media efforts, permits the recipient

of the information to ask clarifying questions, and permits the AIDS educator to modulate the emotional tone of the messages to fit the level of concern in the recipients.

Both groups emphasize that stopping injection is the only certain way of protecting against HIV infection from sharing drug injection equipment, but both also distribute specific instructions on how to sterilize needles and syringes and are now distributing bleach and/or alcohol for sterilizing injection equipment. Thus, both groups are providing means for behavior change as well as information about AIDS. The Narcotic and Drug Research outreach effort also includes ready access to HIV antibody testing for IV drug users who desire such testing.

Studies to evaluate the effectiveness of these street outreach efforts are currently in progress. One interesting early finding from the evaluation studies is that the ex-addict outreach workers are called upon for referrals for drug abuse treatment and other social services. Even though the efforts started as "educational" in the sense of transmitting information (including information on how to practice "safer" injection), the outreach workers are having to address the multitude of other problems faced by IV drug users, and provide access to services for this wide variety of problems. This relationship between trying to provide for "safer" injection and having to address the need for drug abuse treatment and other services is best seen in the studies of AIDS education for drug users that have been conducted in New Jersey.

Studies in New Jersey

The state of New Jersey was the first to employ trained ex- addicts as AIDS educators for IV drug users not in treatment, beginning almost three years ago (Jackson and Rotkiewicz, 1987). The original primary purpose in this

program was to encourage drug users not to share injection equipment and to teach methods of sterilizing the injection equipment. The ex-addicts were instructed not to act simply as recruiters for treatment programs. Despite this original intention of emphasizing sterilization of injection equipment, the reports from the ex- addicts were that many of the IV drug users they were working with felt that it was necessary to enter treatment. The current IV drug users were saying that with their drug habits out of control, it would not be possible to try to confine themselves to using sterile injection equipment. Interviews were conducted with persons entering drug abuse treatment programs in New Jersey that confirmed this relationship between the IV drug users' concerns about AIDS and their desire to enter treatment. Half of the drug users entering treatment programs gave concern about AIDS as a reason for entering treatment, and one-sixth of them reported that they had discussed AIDS with one of the outreach workers (French, personal communication, 1986).

At the time that the ex-addict outreach program was instituted, there were significant barriers to an IV drug user's entering drug abuse treatment in the state. There was a general shortage of available treatment positions, a situation similar to that of New York and other states with large numbers of IV drug users. In addition, reductions in federal funding in the early 1980's had led New Jersey programs to institute client fees as an important source of program revenue. Narcotic detoxification programs were charging a $50 payment upon entry into treatment. The IV drug users addicted to heroin who were in the most need of treatment often had substantial difficulties in obtaining this much money at a single point in time. The IV drug users who were able to get together such a sum often did not see themselves as in need of treatment and would spend the money on drugs.

In order to alleviate this specific problem, the State drug abuse agency developed a "treatment voucher" program (Jackson, et al., 1987). The vouchers were distributed by the ex-addict AIDS outreach workers, and permitted an IV drug user a free treatment episode in a detoxification program. The voucher system also permitted collecting data on the characteristics of the IV drug users who were redeeming the vouchers. Over eighty per cent of the first one thousand vouchers were redeemed for a free episode of detoxification treatment. Young black males, who had previously been under represented in the state treatment system, were over represented among those redeeming the vouchers. Forty per cent of the IV drug users had not previously been in treatment. Of those who entered detoxification treatment, 28% have gone on to longer term treatment. (Length of time in treatment is associated with greater reductions in drug injection (Simpson, et al., 1978), indicating that the voucher system was probably having a long-term effect on drug injection.)

The New Jersey experiences with AIDS risk reduction among IV drug users again show the linkages between knowledge of AIDS and the means for behavior change. The ex-addict outreach workers were clearly reaching current IV drug users with information about AIDS, and the drug users were clearly motivated to change their behavior. Similar to the New York studies in which IV drug users there reported that it is very difficult to maintain safer injection procedures when one is facing withdrawal, the New Jersey drug users reported that they needed a means for reducing their habits before they would be able to protect themselves against AIDS. There is yet no data on the levels of risk reduction for those who went through the voucher program. Whether those who returned to street drug use after detoxification are now practicing "safer" injection has not been determined. A substantial minority of the participants

did proceed into long-term treatment, where they would be in a position to develop life-styles that reinforced abstinence from injecting drugs. At least for this subgroup, there is a reasonable likelihood of a markedly lower risk of HIV infection.

Studies in San Francisco

An outreach program to IV drug users not in treatment is also operating in San Francisco. This program uses both ex-addicts and non- ex-addicts as outreach workers, with both being quite knowledgeable about the street life and drug scene in the city. In addition to providing information about AIDS, the San Francisco outreach workers also distribute small bottles of bleach that can be used to sterilize drug injection equipment. The labels on the bleach bottles give instructions on how to sterilize the injection equipment: the needle and syringe are to be rinsed twice with the bleach, and then rinsed twice with water to remove any remaining bleach. This bleach distribution directly provides means for safer injection. The bleach provides for a quick, easy, and relatively safe method of sterilizing injection equipment. (The effectiveness of this method for actually killing free HIV and HIV infected cells is being examined in a series of laboratory experiments. Preliminary results indicate that it should be quite effective in killing HIV.)

Use of the bleach bottles by IV drug users in San Francisco is being assessed through periodic surveys of drug users interviewed in the streets. In the survey conducted prior to the start of the bleach distribution, only 3% of the drug users interviewed reported that they used bleach to sterilize drug injection equipment. In a second survey, conducted after the bleach distribution program had been operational for a year, 67% of the IV drug users reported that they were using bleach to sterilize drug injection equipment

(Watters, 1987). Chaisson and his colleagues (1987B) are also conducting research on IV drug users in San Francisco and report a similar, though smaller, increase in the use of bleach among IV drug users in the city. They find approximately half of their subjects report using bleach to sterilize drug injection equipment.

Although there is consistent evidence that more IV drugs users in San Francisco are now using bleach, it is not yet possible to know if bleach use has reached the degree of social acceptance to be a ritualized part of drug injection in San Francisco. Were bleach use to be incorporated into the IV drug use rituals, then it would be seen as worthwhile in itself, and drug users would use it regardless of whether they felt they were immediately at risk for infection with HIV.

An interesting aspect of the current bleach distribution system in San Francisco is that the workers distributing bleach are having to spend more and more time doing street counseling and acting as crisis advocates for IV drug users. This work goes beyond the AIDS education and bleach distribution to cover drug abuse problems and the special concerns of IV drug users who believe that they have already been exposed to HIV (J.K. Watters, personal communication, 1987).

Studies in Amsterdam

Amsterdam, along with several other Dutch cities, are unusual in that they already had systems specifically for reducing the spread of infectious viruses among IV drug users in place before HIV was introduced into the IV drug use group in the country. The sale of sterile needles and syringes to IV drug users had been permitted under the law, but many pharmacists refused to sell to persons they suspected of being IV drug users. Organized drug user's

unions (Junkiebonden) worked with public health officials to devise a system that would permit IV drug users easier access to sterile injection equipment in order to reduce the spread of hepatitis B within the group. The "needle exchange" systems, in which drug users could return used injection equipment and exchange it for new equipment without cost, were devised to meet this need.

The needle exchange systems were generally operated on a small scale and did not substantially reduce the spread of hepatitis among IV drug users in Holland (Buning, et al., in press). The IV drug users apparently did not consider hepatitis B to be a sufficient threat to use sterile equipment sufficiently frequently. HIV was also introduced and spread to a considerable extent in Amsterdam prior to the development of concern about AIDS.

Concern about AIDS has led to a greater demand for sterile needles and syringes, and a great expansion of the needle exchange system. Information about AIDS was distributed through the mass media, the drug abuse treatment programs, and through the Junkiebonden. The needle exchange system has been greatly expanded--in Amsterdam it has gone from distributing 25,000 sterile needles and syringes per year prior to concern about AIDS to 600,000 sterile needles and syringes per year currently. Additional needle exchanges are being established in smaller Dutch cities that did not have them prior to concern about AIDS.

During the period when Amsterdam established and expanded its needle exchange program, the number of IV drug users in the city remained stable, as did the demand for both drug free and methadone maintenance treatment. There is no evidence that the needle exchange system led to an increase in drug injection in the city (Buning, et al., in press). Recent studies of IV drug users in Amsterdam indicate much more use of the exchange due to concerns

about AIDS. In the studies by van den Hoek and colleagues, the percentage of IV drug users who have been utilizing the exchange system increased from less than 10% to almost 50% (van den Hoek, et al., 1987). These IV drug users have also been decreasing their frequency of injection as they increasingly utilize the exchange system; the percentage who inject more than once per day dropped from almost 90% to less than 50%.

The data from the Amsterdam studies indicate that "safer" injection as a means for reducing the risk of AIDS and providing treatment to reduce/eliminate drug injection as a means for reducing risk do not need to conflict with each other. The hepatitis data from Amsterdam, as well as the initial spread of HIV in that city, also indicate that merely providing the means for safer injection is not sufficient to stop the spread of HIV. The knowledge of AIDS and the motivation to avoid the disease must also be developed.

Studies in Edinburgh

Edinburgh has one of the highest HIV seroprevalence rates among IV drug users of any city in northern Europe (Robertson, et al., 1986). There is relatively good documentation of the epidemic in Edinburgh, making it of particular interest for studies of potential AIDS risk reduction. Robertson and colleagues (in press) have recently completed such a study and found substantial risk reduction. Forty-nine known IV drug users were interviewed in 1986 with a six month follow-up for 80% of the study group (most of the follow-up interviews were done in 1987). The initial interviews coincided with increased media attention to AIDS among IV drug users in the city, with antibody teat feedback for the subjects, and with the start of an "unofficial syringe exchange" program for IV drug users in the area.

The study subjects showed several significant reductions in AIDS risk behavior related to drug injection. The average number of injections per week declined, as did the average number of equipment sharings, the average number of persons shared with, and the average numbers of persons present when equipment was shared (all at $p > .0005$). The percentage of subjects who "always" shared equipment declined from 55% to 13%. In addition to the reduction in sharing of injection equipment, there was also a substantial drop in the number of subjects who were injecting drugs; all were injecting at the start of the study and 20% had stopped injecting at follow-up. Similar to results from Amsterdam, the provision of sterile injection equipment was followed by both decreases in sharing of injection equipment and reductions in levels of drug injection.

It is not possible to separate possible causes of the behavior change for this group. Concern about AIDS and the availability of sterile injection equipment were the most frequently stated reasons for behavior change by the subjects themselves (J.R. Robertson, personal communication, 1988), corresponding to the knowledge of AIDS and means for behavior change. No data were collected relevant to any reinforcement of behavior change.

Studies in Sacramento

In a study of IV drug users in Sacramento, Flynn and colleagues have shown continued risk behavior despite widespread knowledge of both the modes of transmission of AIDS and the knowledge that the AIDS virus was present in the area (Flynn, et al., 1987). Over ninety per cent of the subjects in the study knew of transmission through sharing drug injection equipment, heterosexual transmission, and perinatal transmission. Despite this knowledge, the majority were sharing equipment. They did attempt to clean the equipment

between uses, but this was typically with water only, and rarely in a manner that would kill HIV. In addition, over ninety per cent of the subjects believed that they would eventually become exposed to the AIDS virus if they continued to share injection equipment.

This study indicates that basic information about the modes of transmission for AIDS is not sufficient to produce risk elimination, but should not be considered evidence that IV drug users will not change their behavior in response to the threat of AIDS. First, the study indicated that the IV drug users had not eliminated their risk behavior, but did not address whether they had reduced their risk behavior. This is comparable to the studies of gay men, which show reduction of risk behavior to be the typical response to concerns about AIDS, but for total elimination of risk to occur only in a minority of those concerned about AIDS (Des Jarlais, et al., 1987B; Coates, et al., 1987). Second, while knowledge of transmission was quite common, knowledge about risk reduction techniques was incomplete. As the authors noted, the subjects did not know how to use bleach or alcohol to sterilize injection equipment properly. Thus, the means for risk reduction were limited. Finally, there was no indication of any reinforcement for risk reduction, either through a belief that it would be successful or through social reinforcement.

Studies in Baltimore

Because of a normal bias toward positive results, studies of AIDS education programs that do not show behavior changes are less likely to appear at scientific conferences and in scientific journals. It is thus important to examine well-designed programs that do not show the desired changes in behavior. Baltimore utilized a group of trained ex-addicts to act as AIDS

educators for IV drug users not in treatment (McAuliffe, et al., 1987). The program was similar in many ways to those in New Jersey, New York, Chicago, and Washington, D.C. The ex-addicts distributed information about AIDS, including information on how to sterilize drug injection equipment through boiling or the use of bleach or alcohol. The ex-addict educators did not, however, actually distribute bleach or alcohol for use in sterilization. They also were not closely linked to treatment programs, and thus were not able to provide expedited referrals into treatment.

A relatively sophisticated evaluation design was used to assess the effectiveness of the program. The city was divided into a number of areas, and pre-intervention interviews were conducted with IV drug users in those areas. The ex-addict AIDS educators were then randomly assigned to work in half of the areas. Post-intervention interviews were again conducted with IV drug users in all areas one month after the intervention had begun. Comparisons were made of the changes in knowledge about AIDS and risk behavior between the intervention and the control areas. The intervention areas showed greater increases in knowledge and more risk reduction compared to the control areas, but only the changes in knowledge reached statistical significance. The type of knowledge change that did reach statistical significance tended to be technical knowledge, e.g., early symptoms of AIDS, which would not ordinarily be carried in the mass media or in the oral communication networks of the IV drug use subculture. Thus, it is likely that the differences in knowledge are attributable to the ex-addict outreach workers.

There are several possible reasons why the evaluation of this ex-addict outreach program did not show any statistically significant risk reduction attributable to the intervention. It is possible that the intervention led to subtle improvements in risk reduction that were not detected by the interview.

For example, better knowledge of the natural history of HIV infection might have led an IV drug user who was already reducing the number of persons with whom he or she was sharing equipment to increase the reduction. IV drug users who were already attempting to clean their injection equipment may have been doing a better job after learning more about proper sterilization techniques.

Although subtle improvements in risk reduction may have been missed in the study, it is more important to understand why there was not a large scale effect of the intervention. There was little provision of increased means for risk reduction to accompany the information about AIDS. The program did provide information on how to sterilize injection equipment, but it did not provide any easy and convenient methods for sterilization, such as small bottles of bleach or alcohol or actual distribution of sterile injection equipment. The program also did not provide access to treatment for IV drug users who might have needed to reduce their levels of drug injection as part of risk reduction. Although the data are not complete with respect to mechanisms for reinforcing risk reduction behavior, it appears that the program also did not provide for any such mechanisms. There was no indication that the participating IV drug users were convinced that the information they obtained could protect themselves against AIDS, so it is problematic whether cognitive self-reinforcement would have occurred. The one month between the intervention and the final data collection did not permit much time for the development of new social norms to reinforce safer injection behaviors.

Although more study is needed to understand why the Baltimore program did not lead to large scale risk reduction, it would appear that two of the three components of the cognitive-behavioral framework for risk reduction were missing.

STUDIES OF HIV ANTIBODY TESTING AMONG IV DRUG USERS

There have been frequent calls for increased use of HIV antibody testing as a means for increasing AIDS risk reduction. These have included suggestions that antibody testing be made "routine" for all persons entering drug abuse treatment programs. Although antibody testing goes well beyond what would usually be considered as "AIDS education," it is appropriate to consider the limited number of studies of antibody testing as a means for increasing risk reduction among IV drug users. Antibody testing differs from standard AIDS education in that rather than informing a person that he or she is at risk for HIV infection, the primary information is whether or not the person has already been infected. Thus, for seropositives, antibody testing cannot be linked to avoiding infection, but rather is linked to avoiding transmission to others, and to potential ways of avoiding progression of the infection. The hope is that the seropositive person will act "responsibly" to avoid possible infection of others--and a major concern with antibody testing is that the stress of learning one is seropositive would actually increase behavior associated with transmission to others. For seronegatives, the hope is that learning test results will strengthen intentions to avoid risk behavior in the future.

There have been three such studies presented at scientific meetings to date (Casadonte, et al., 1986; Cox, et al., 1986; Marlink, et al., 1987). There is considerable consistency across these three studies. All report that the counseling and testing procedure was associated with reduced risk behavior in the follow-up period, that seropositives experienced a period of significant distress upon learning their test results, and that seropositives had greater risk reduction than seronegatives. The risk reduction primarily included reducing/eliminating drug injection, or reducing/eliminating

equipment sharing for those who continued to inject. The distress among seropositives included anxiety, sleep disturbances, and some return of previous psychiatric symptoms. Social isolation and stigmatization, including from family and friends, often served to exacerbate the psychological distress. The distress generally lessened over a period of several weeks as the person came to learn to live with his or her seropositive status. The seropositives may have also reduced their risk behavior (they particularly may have eliminated or reduced drug injection) in the belief that this would reduce their chances of developing AIDS. (There is consistent in vitro and some in vivo evidence that repeated immunologic stimulation serves to increase the rate of HIV immunosuppression (Des Jarlais, et al., 1987A).) There was evidence of "responsible" behavior with respect to increasing safer sexual practices, even though this led to the break-up of some of the relationships (Casadonte, et al., 1986).

Although these studies are encouraging with respect to the possible use of antibody testing as a risk reduction method, caution is required for any generalization from these reported studies for several reasons. First, these studies may not be representative of what typically happens with antibody testing for IV drug users. The usual bias for accepting research studies for scientific presentation or publication is in favor of positive results. There may be many unpresented studies that did not find positive outcomes associated with antibody testing. Antibody testing of IV drug users has been conducted in a large number of locations, and if it did uniformly lead to dramatic increases in risk reduction, then one would expect to see more documentation of this in the scientific literature.

A second reason for great caution in generalizing from these three studies is that the process through which antibody testing may lead to increased risk reduction is not well understood. Good pre-and post-test

counseling is often considered vital for testing to lead to risk reduction, but there are yet no data that allow for determination of the critical aspects of pre-and post-test counseling.

From a different perspective, trying to evaluate the usefulness of antibody testing by using classical research methods--comparing the behavior of those who were tested against the behavior of those who were not tested--may be missing the value of testing in controlling HIV among IV drug users. In one of the three reported studies (Casadonte, et al., 1986), a comparison group of non-tested subjects from the same drug abuse treatment program was also studied and showed comparable risk reduction to those who were tested. The comparison group was aware of the testing, and it may have been this increased and personalized awareness that led to the risk reduction. In Amsterdam, early antibody testing conducted through a research study increased local awareness of AIDS among IV drug users in the city, and after a period of emotional concern and conflict, was followed by increased AIDS prevention activities (R.A. Coutinho, personal communication, 1987) Thus, it may be that the association between antibody testing and risk reduction occurs not because individuals learn their antibody status but because testing leads to increasing and personalized awareness/concern about AIDS among IV drug users in the local area, which in turn leads to risk reduction.

An additional potential use of antibody testing for reducing AIDS among IV drug users has been advocated by Moss (Chaisson, et al., 1987A) for cities in which HIV seroprevalence among IV drug users is low. This strategy is based on the traditional public health approach of locating infectious persons and then intervening to prevent transmission from those persons. Voluntary antibody testing has been made available on a large scale for heroin injectors in San Francisco, with possibly a third of the IV heroin users tested in the

first two years of the program. Efforts are made to provide full medical care for seropositives, to place them in special drug abuse treatment programs, or at least to intensively counsel them not to share their drug injection equipment with others. (Note that this strategy requires the active cooperation of the IV drug users for testing and the active cooperation of serpositives after testing. Coercive actions that would lead IV drug users to hide from testing would lead to failure of the approach.) The effectiveness of this use of antibody testing does not depend upon the post-test behavior of the majority of the persons tested (seronegatives) as much as quickly locating the limited number of seropositives and intervening to prevent them from transmitting HIV to other IV drug users.

Because of government support for antibody testing, both as part of various research studies and as a service to persons who might want to know their antibody status, counseling and antibody testing of IV drug users are likely to increase over the next several years. At Present there are only limited conceptualization of how antibody testing can be used to reduce AIDS among IV drug users, and similarly limited data on how counseling and testing actually do or do not work to reduce AIDS among IV drug users. The greatest part of the formulation of AIDS prevention programming for IV drug users and data collected on behavior change among IV drug users has been in terms of protecting IV drug users from becoming exposed to HIV. For antibody testing, it may be more relevant to formulate research questions in terms of how to reduce the likelihood of IV drug users who are already exposed from transmitting the virus to others. Both conceptualization and research on counseling and antibody testing are critically needed.

STUDIES OF CHANGES IN SEXUAL BEHAVIOR

As IV drug users are the major source of heterosexual transmission of HIV in the United States and Europe, the extent to which they change their sexual behavior in response to AIDS will be critical in determining the future of the epidemic in the U.S. and Europe. Data on changes in sexual behavior are rather limited, but what are available generally show less behavior change with respect to sexual transmission than with respect to sharing of injection equipment transmission of HIV. In the first study of AIDS related behavior change among methadone patients (Friedman, et al., 1987), only 14% of the subjects reported having changed their sexual behavior compared to 59% reporting having changed their drug injection behavior. A later study of IV drug users not in treatment in New York found 31% reporting sexual behavior changes compared to 41% reporting changes in injection behavior (Kleinman, et al., 1987). In a San Francisco study that showed almost two thirds of the IV drug users adopting bleach to sterilize injection equipment, the increase in the percentage of IV drug users practicing "safer sex" increased from only 5% to only 15% (Watters, et al., 1987). In Edinburgh, the study by Robertson and colleagues (in press) found statistically significant reductions in both frequency of injection and sharing of injection equipment, but the major change in sexual behavior--a reduction in the number of partners--did not quite reach statistical significance ($p < .10$).

Specific efforts focussed on heterosexual transmission of HIV have been incorporated into many AIDS prevention efforts for IV drug users. All of the outreach workers provide information about heterosexual transmission. Some of the outreach workers and some drug abuse treatment programs are also providing condoms to IV drug users at no charge. In New York, the condoms are frequently

taken from the treatment programs and then re-sold on the streets, indicating a general community awareness of the possibilities of heterosexual transmission (N. Peyser, personal communication, 1987).

Ongoing studies of IV drug users not in treatment indicate that there may be differential use of condoms and "safer sex" practices by the type of the sexual relationship (Des Jarlais, et al., in press). It appears fairly easy to introduce condom use into casual sexual relationships and relationships between prostitutes and their customers, where there is no large emotional commitment to the partner or to the relationship. Conversely, it appears very difficult to introduce condoms into an ongoing sexual relationship involving substantial (but not absolute) interpersonal commitment. There appear to be a large number of possible reasons for the difficulties in practicing "safer" sex within these commitment relationships.

The great majority--approximately three quarters--of IV drug users in the U.S. and Europe are male, and the prototypical sexual relationship is between a male IV drug user and a female who does not inject drugs. When one partner does inject drugs and the other does not, the great likelihood for transmission of HIV is that the drug injecting partner will be (or has been) exposed through sharing of drug injection equipment, and will then transmit the virus to the non- injecting partner. The two are not at equal risk of being the "transmitting" partner within the relationship. There are individual reports of IV drug users who will not mention the subject of "safer sex" with their sexual partners for fear that the partner would then leave the relationship (J. French, personal communication, 1986). In Casadonte's study of antibody testing, in which seropositives were strongly counseled to use condoms, approximately half of the long-term relationships did dissolve as a result of the IV drug user's introducing condom use (Casadonte, et al., 1986).

In addition to the threat to the relationship from an unequal risk of being the source of HIV, the use of condoms also can imply sexual infidelity in the long term relationship (Des Jarlais, et al., in press). Even if the partners are aware that sexual fidelity may not be occurring, the use of condoms forces attention on this failure to meet the desired behavioral standards for the relationship.

At present it is not possible to assign relative importance to the various reasons why "safer" sex is not practiced more often among IV drug users and their sexual partners. It should be noted that gay men are also less likely to practice "safer" sex within long-term "commitment" relationships (Coates, et al., 1987), so that "cross-subcultural" comparative studies might be particularly useful on this topic.

Similar to the situation with counseling and antibody testing, it may be necessary to reformulate the research questions regarding sexual behavior changes among IV drug users. Epidemiologically, the primary risk in the sexual behavior of IV drug users is not that the IV drug user will be exposed through sexual activity, but that the IV drug user will transmit the virus to a sexual partner who does not inject drugs. Raising this issue of research on how to reduce the risk of IV drug users' transmitting the virus to others need not imply that IV drug users are not motivated to protect the health of their sexual partners and potential children, but rather to raise questions about competing motives, and what situations make it more or less difficult to act on the motives to protect the health of others.

COMPARISON OF DIFFERENT "EDUCATION" EFFORTS FOR PRODUCING BEHAVIOR CHANGE AMONG IV DRUG USERS

The studies reviewed above indicate that a large percentage of IV drug users will change their behavior in order to reduce the risk of developing AIDS. The exact percentage of those changing their behavior would seem to depend upon their level of information about AIDS, the available means for behavior change, and the available sources for reinforcing the changed behavior. To the extent that there are multiple determinants of AIDS risk reduction among IV drug users, then the "best" prevention program will vary according to the local situation.

For example, the effectiveness of an ex-addict outreach education program may depend more on the availability of means for behavior change than on the ability of the outreach workers to communicate information about AIDS. As noted above, several of these outreach programs have led current IV drug users to seek entry into treatment. Thus, an outreach program in a city that has excess treatment capacity may be more "effective" at changing AIDS risk behavior than a similar program in a city that already has more demand for treatment than its current capacity. Planning for preventing AIDS among IV drug users should include assessment of current levels of knowledge, means for behavior change, and possible mechanisms for reinforcing the risk reduction.

Even within a single city, there is likely to be a need for multiple AIDS prevention strategies rather than relying upon a single "best" strategy. Many of the programs that teach IV drug users ways of "safer" injection have found that they must also provide referrals to treatment and in-the-street counseling to address the many life problems that IV drug users face in addition to AIDS. Similarly, many drug treatment programs in New York and San Francisco, recognizing that entry into treatment does not invariably lead to complete elimination of drug injection, are now teaching methods of safer injection as part of AIDS education for their patients. The experience to date

of AIDS prevention programs in the U.S. is that they tend to evolve towards multi-faceted efforts, providing both information and several types of means for behavior change. This experience argues against the finding a single best strategy for AIDS prevention among IV drug users.

COST EFFECTIVENESS OF DIFFERENT AIDS "EDUCATION" PROGRAMS FOR IV DRUG USERS

Addressing the cost effectiveness of different AIDS education programs for IV drug users was a specific task for this paper. The current data indicate that multiple strategies are needed, so that the "effectiveness" of any single program is highly dependent upon its place in the mix of current programs within a geographic area. Current data are not good enough to determine optimal allocation of resources among prevention programs for a given geographic area. Despite this limitation, there are some comments that should be made with respect to relative and unavoidable costs for AIDS prevention among IV drug users.

First, the tremendous financial costs associated with the development of AIDS make a prevention program seem desirable. Estimated costs for the treatment of a single case of AIDS run from approximately $30,000 to $150,000 (U.S. Congress, OTA, 1987), and the development of antiviral treatments is likely to increase rather than decrease the costs of treating persons with AIDS. Because IV drug users are more likely to develop pneumocystis pneumonia than gay men, the costs of AIDS treatment for this group are likely to be higher than average. IV drug users are also more likely to spread HIV to sexual partners who do not inject drugs and to newborn children.

Second, specific AIDS education programs to not occur in a vacuum with respect to information about AIDS. There is still much to be learned about AIDS, and the mass media undoubtedly will continue to cover the new stories,

and this information will spread to IV drug users. Ongoing AIDS education for both the staff and the clients is also becoming a standard part of drug abuse treatment programs. Conducting such ongoing education will soon be considered a necessary part of operating a treatment program. The monetary costs for conducting such ongoing education cannot be easily measured in the amounts of money spent on the education. Rather the cost of not providing the ongoing education would be disruption of the program if staff and client needs for information about AIDS are not met. The information disseminated in the treatment programs will flow to IV drug users not in treatment and be integrated with information from the mass media as well as any special educational programs.

Third, providing additional drug abuse treatment may be a relatively financially expensive means for changing AIDS risk behavior, but will be frequently included as an AIDS prevention strategy for a variety of non-financial reasons. Methadone maintenance treatment costs approximately $2500 to $3000 per patient per year, while residential drug-free treatment costs approximately $10,000 to $12,000 per client per year. For many persons in government, in drug abuse treatment programs, and in the general population, however, AIDS will be seen as merely one more reason why treatment should be provided to get IV drug users to stop their drug use. For many of these people, getting IV drug users to stop their drug use will be the only acceptable way of trying to prevent AIDS among current IV drug users. The experience of many of the "safer injection" programs that found they needed to provide referrals to treatment and in-the-street counseling will provide additional support for the demand for more drug abuse treatment capability.

Despite the practical necessities of doing AIDS education in treatment programs and providing additional treatment capacity, providing current IV drug users with the means for "safer injection" is probably the most effective

method of preventing AIDS among IV drug users from both a time and a fiscal perspective. Programs such as the distribution of bleach for sterilizing injection equipment (or actual distribution of sterile injection equipment) are both very low cost for the number of persons who are likely to change their behavior and can be made operational in a very short time. The estimated annual cost for fielding an AIDS outreach worker, including providing bleach for distribution to IV drug users, but not including supervision or overhead expenses, is between $25,000 and $30,000 (C. Mauge, personal communication, 1987; J. Newmeyer, personal communication, 1987). Such an outreach worker should be able to work with between 300 and 600 IV drug users in the field.

EFFECTIVENESS IN REDUCING THE SPREAD OF HIV AMONG IV DRUG USERS

The studies reviewed above have basically addressed AIDS risk reduction among IV drug users and not risk elimination. This is not surprising. The same pattern has been found in the response of gay men to the AIDS epidemic, where the majority are also practicing risk reduction but not risk elimination. It does raise the question of whether the behavior change will do anything more than create a temporary delay in reaching the same number of HIV infected drug users as would have occurred without any risk reduction.

Longitudinal studies in New York (Des Jarlais, et al., 1987A; Selwyn, et al., 1987), San Francisco (Watters, et al., 1987), and Amsterdam (van den Houk, et al., 1987) have all indicated continued spread of the virus in those cities despite risk reduction among IV drug users in those cities. It is not even possible from the present data to be certain that the risk reduction has led to a slowing of the spread of HIV among IV drug users in those cities.

This should not be understood as implying the failure of risk reduction efforts in those cities. Given the difficulties in predicting the rate of spread in the absence of risk reduction, there simply have not been data

collected over sufficient time periods to make the determination. An example will be useful here . Given the rate of spread observed in Manhattan (Novick, et al., 1985), Italy (Angarano, et al., 1985), and Edinburgh (Robertson, et al., 1986), one would expect a city with a current 10% seroprevalence rate among IV drug users to increase to between 20% and 30% over the next year in the total absence of any risk reduction. If a bleach distribution program led approximately half of the IV drug users to adopt risk reduction over a one year period-- similar to the San Francisco experience--it still would not be likely that a noticeable difference in seroprevalence would be found. Assuming that the rate of adoption was constant over the year, and that the bleach was 80% effective in preventing HIV exposure in all of the IV drug users who used it, the observed rate of increase in seroprevalence would be between 8% and 16%. Using seroprevalence rates to measure a public health scale effect of AIDS risk reduction activities among IV drug users will simply require studies of two to four years in a single area. This is the time frame that was required to reach the conclusion that risk reduction efforts among gay men had led to a major reduction in the rate of HIV transmission (Winkelstein, et al., 1987).

On a pessimistic note, it is possible that the present levels observed in cities such as New York, San Francisco, and Amsterdam may greatly slow the spread of HIV among IV drug users, but only delay the time needed to reach the same saturation point of HIV infection in the IV drug use population. For individual IV drug users this delay may be important as a certain percentage cease injecting drugs through normal treatment programs or on their own without treatment. Thus, these drug users may be spared HIV infection.

The importance of the delay from a public health perspective, however, would be the additional time then available for other related forms of prevention. The three most important of these would be prevention of

heterosexual transmission from IV drug users to persons who do not inject drugs, prevention of perinatal transmission from IV drug users or from the sexual partners of IV drug users, and the prevention of IV drug use among persons who are not currently injecting. If sufficient efforts are mounted in these areas, risk reduction among IV drug users could have important public health consequences even if it is not sufficient to protect indefinitely the IV drug users themselves.

SUMMARY

The data from current studies of AIDS risk reduction among IV drug users do show that the drug users will change their behavior in order to reduce their chances of developing the disease. The change process is complex, however, and not simply a matter of IV drug users' learning that they are at risk for AIDS and how the disease is transmitted. The studies also suggest that the availability of means for behavior change--the means for reducing drug injection, for practicing "safer" injection or for both--are also a critical part of the risk reduction process. Also indicated is a need to reinforce the risk reduction behavior, either through a belief system that the new behavior is effective in preventing AIDS or through social approval from peers, although relatively few studies have examined this question.

The effectiveness of any specific AIDS education program in changing the behavior of IV drug users will thus depend upon a variety of factors, some of which may not be addressed by the program itself. Many of the current programs have evolved towards multiple simultaneous approaches: information, additional treatment, and means for "safer" injection. This evolution suggests that no single approach will have maximal effectiveness even within a single geographic area.

Whether the extent of behavior change that can be produced through AIDS prevention programs and normal communications within the society and among the IV drug users will be sufficient to stop the spread of HIV among IV drug users remains to be seen. Answering this question will first require more research on the "natural" spread of HIV in the absence of behavior change so that there is a standard to compare with the spread under conditions of risk reduction. Cohort and ongoing seroprevalence surveys will be needed, and these will be expensive in terms of both time and money.

APPENDIX A

Methodological Considerations in Assessing Behavior Change

The vast majority of AIDS risk reduction studies among intravenous drug users have used self-reported behavior rather than actual exposure to HIV as the method of measuring the outcomes of any educational interventions. There are many good practical and scientific reasons for using these self reports. HIV exposure rates among IV drug users are not likely to be very sensitive to the effects of an educational program. It may be necessary to follow large numbers of subjects over several years in order to see differences in HIV exposure between experimental and comparison groups. This long time period not only adds great expense to the study, but also poses threats to the scientific value of the study. The loss of subjects to follow-up, which will undoubtedly occur with any study of IV drug users, may make drawing conclusions more difficult. Similarly, historical changes over a long follow-up study may also threaten the ability to distinguish differences between experimental and comparison groups. The act of taking blood samples, necessary if one is to use HIV exposure rates as an outcome measure, may interact with the treatment being given or even be a more powerful educational intervention than the program that is the supposed topic of the study. (For a full discussion of these types of methodological problems in assessing AIDS prevention programs for IV drug users see Des Jarlais and Friedman, 1987.) Because of these practical and scientific reasons, it is likely that self-reported behavior will continue to be the primary way of assessing AIDS prevention efforts for IV drug users. It is therefore imperative to examine the factors that would affect the validity of these self-reports and methods of assessing that validity.

There are two major threats to the validity of the behavioral self-reports of IV drug users: the ability of the subjects to accurately recall the information requested, and motivation to provide inaccurate information. The threats to accurate memory can be divided into two classes--difficulties that "normal" subjects would have in remembering certain types of events, and effects of intensive drug use on memory. Studies of drug use in which the behavior was recorded on a daily basis show both great variability among individuals and across time for individuals (Johnson, et al., 1985). The variability includes both large differences in the number of injections on a given day--from none to over ten--and in the locations and settings in which the drug injection occurs. Given this variability in drug injection behavior, it is exceedingly unlikely that IV drug users will be able to "remember" the specific circumstances of their drug injection behavior over extended periods of time. Answers to questions concerning whether or not they shared equipment, how the equipment was obtained, the number of persons with whom they might have shared the equipment, are not likely to be recalled from individual memories of the events. Rather they are likely to be "reconstructed" through some form of "averaging" of "typical" behavior during the time period (Bradburn, et al., 1987). Such averaging/reconstruction is subject to unintentional biasing in the direction of a preferred self-image as well as errors from simple arithmetic in combining the frequencies of the various different events.

A second source of difficulty in accurate reporting of drug use behavior is the possible interference of the drug on memory formation. Many drugs can influence the ability to attend to the immediate environment, and thus interfere with memory of what happened when one was under the influence of the drug. The experience of withdrawal may also be sufficiently unpleasant that

the drug user focuses on obtaining the drug and pays relatively little attention to the specific circumstances related to the sharing of drug injection equipment. Some drugs act as neurotoxins, actually destroying nerve tissue and causing notable deficits in the capacity for memory. Fortunately for research on HIV transmission, heroin and cocaine, the two drugs that are the most frequently injected, appear to have relatively little effects on memory. They certainly are not in the class of alcohol, with its well documented ability to create memory deficits.

Concerns about biased data from efforts by drug users to maintain a favorable presentation of self were a concern in drug abuse research well before AIDS. A variety of techniques have been developed to minimize this problem. First is the creation of a "research setting" for the collection of data. This setting includes complete confidentiality for the information obtained, with no rewards or punishments for "correct" or "wrong" behavior. Second is the use of well trained interviewers. The interviewers should be familiar with the IV drug use subculture, so that they can convey a non-judgmental acceptance of the behavior and detect and (without hostility) challenge fabulations.

Within such a research setting, the importance of AIDS will usually serve to motivate IV drug users to provide the most accurate information they can. In general, IV drug users are well aware of the importance of AIDS and thus the need for accurate information on behavior related to the disease. If the drug user does not have AIDS, he or she will be concerned about helping develop ways of protecting him or herself. If the drug user does have AIDS, he or she usually will be concerned about making a contribution to preventing the spread of the disease to others.

The ultimate test of the validity of self-reported information from IV drug users, however, will be construct validity. Do the self-reported behaviors consistently match with biologic variables according to reasonable theories of HIV transmission and disease development? This can be determined only by comparing results across studies. So far, frequency of injection and use of shooting galleries have been positively aasociated with a biological measure (exposure to HIV) in a number of studies (Marmor, et al., 1987A; Weiss, et al., 1985; Schoenbaum, et al., 1986; Chaisson, personal communication, 1987). The drug users were not aware of their serologic status at the time of interview in these studies. It is difficult to formulate reasonable hypotheses that would causally link memory impairment or self-presentation behavior to relationships between these self-reported behaviors and the presence of antibody to HIV. Parisomy supports the conclusion that these consistent findings represent relationships between the actual behavior of the IV drug users and their exposure to HIV.

The question of the validity of self-reported behavior by IV drug users will need to receive continuous scrutiny in research on AIDS risk reduction. It does appear, however, that if the questions are phrased within the "normal" operations of human memory, and an appropriate "research setting" is used for the interviewing, then IV drug users generally can and do give accurate reports of their behavior.

APPENDIX B

Heterosexual Transmission of HIV from Intravenous Drug Users: Regular Partnerships and Prostitution

Don C. Des Jarlais
New York State Division of Substance Abuse Services

Samuel R. Friedman
Douglas Goldsmith
Narcotic and Drug Research, Inc.

William Hopkins
New York State Division of Substance Abuse Services

Introduction

Intravenous (IV) drug users are the largest group of heterosexuals to have developed AIDS in the United States and Europe. They have also become the predominant source for transmission of HIV to heterosexuals who do not inject drugs and for perinatal transmission (Des Jarlais and Friedman, 1987). To a great extent, the future course of the AIDS epidemic in the United States and in Europe will depend upon the rate of spread of HIV from IV drug users to non-drug injecting heterosexual partners. The worst case scenario is that IV drug users will form a large reservoir of HIV infection with little sexual risk reduction among the IV drug users and their non IV drug-using sexual partners and eventually create the potential for self-sustaining heterosexual transmission.

This paper reviews the authors' research on the potential for heterosexual transmission from intravenous drug users, including potential transmission from IV drug-using prostitutes. Prior to AIDS, there was some research on the sexual behavior of IV drug users, including those engaged in prostitution. The extent of the research, however, was not sufficient to quantify the behavioral data needed in models of heterosexual transmission, and there was almost a total absence of data on how the sexual behaviors of IV drug users might be modified to reduce sexually transmitted diseases. Much of the research reviewed here is ongoing and the findings must in many cases be considered preliminary. Observations made without references are based on our current ethnographic studies in New York City.

Basic Demographics

Two demographic factors greatly influence heterosexual behavior among IV drug users. First, IV drug use in the United States is heavily concentrated in minority populations that have traditionally suffered from a wide variety of

health, social and economic problems. Eighty percent of the cases of AIDS among IV drug users have been Black or Latino, as have ninety percent of the heterosexual transmission cases (Centers for Disease Control, personal communication, 1987). There is great diversity among the Black and Latino communities in the United States, and one should not ignore the significance of this diversity for sexual behaviors that can effect the transmission of AIDS. Nevertheless, minority communities that have high rates of IV drug use generally have very high rates of unemployment among their youth. This unemployment, along with other factors, has served to undermine the stability of the traditional married father-mother-child family unit (Wilson, 1987).

The second basic demographic factor is that the great majority--approximately 75%--of IV drug users in the United States are males. High male to female sex ratios within a group are usually associated with males having sexual relationships outside of the group and with males' utilizing prostitutes as a sexual outlet. Among IV drug users, the great majority (approximately three-quarters) of males have their primary sexual relationships with women who do not inject drugs, and the number of females who do not inject drugs but are regular sexual partners of male IV drug users is at least half as large as the number of IV drug users (Des Jarlais, et al., 1984A). (A portion of female IV drug users also have regular male sexual partners who do not inject drugs, but the currently available data are too scarce and inconsistent to estimate the percentage).

Effects of Drug Use on Sexual Activity

The basic biology of human beings seems to include a strong potential for experiencing sexual activity as pleasurable. IV drug use subcultures in the United States strongly value intense drug induced pleasure, and sexual

pleasures are valued within the same framework. When IV heroin users try to explain the quality of injecting very good heroin to persons who have never injected, the most commonly made analogy is that the heroin rush is "like having an orgasm all through your body."

Non-injecting sexual partners of IV drug users also value sexual pleasure and expect the IV drug user to perform sexually. This performance is often in exchange for providing food, shelter, or small amounts of money. (See Johnson, et al., 1985 for examples of these exchanges). It is important to note that neither party defines such exchanges as "prostitution." These exchanges are seen as part of a committed relationship (discussed below) and, in the words of one of our street researchers, it is a "c'mon honey" expectation that the male will provide the female with sexual pleasure.

The physiologic effects of drugs on libido and sexual functioning are complex and reviewing them is beyond the scope of this paper. It is important, however, to discuss some of the interactions between drug use, sexual pleasure, and sexual performance. For the purposes of this discussion, an important distinction is between the "functional" IV drug user and the "low" IV drug user (these terms come from our ongoing ethnographic studies in New York).

"Functional" IV drug users are capable of earning more money than is needed for their drug use, although the activities for earning money may be illicit; avoid most problems with the law; may keep drug use hidden from the public at large and even from significant others; and try to "look sharp." For these IV drug users, if sex while straight is good, then sex while stoned is likely to be even better. The fact of enjoyment of stoned sex is not dependent upon the pharmacologic effects of any specific drug, but upon the psychological appreciation of the differences between the straight and the

various stoned states. Alcohol effects may be perceived as relaxing, marijuana effects may be perceived as prolonging time perception, cocaine effects as a generalized sexual arousal, and heroin (for males) as delaying ejaculation and prolonging intercourse. Thus, despite the wide variety of effects from both injected and non-injected drugs, drug subcultures have been able to emphasize some aspects of each drug to enhance sexual pleasure.

The additive qualities of sex and being atoned will therefore lead to a tendency to have sex while stoned whenever the sexual opportunity is readily available. This leads to considerable sexual activity outside of committed relationships. It may also lead to a disinhibition effect against safer sex practices when stoned, although data on this among IV drug users are not yet available.

For the "low" IV drug users, however, too much drugs are too much. These drug users are likely to be physiologically addicted to heroin, cocaine, alcohol or some combination of these. They are often desperate for money to obtain drugs, and take very large risks to obtain money and drugs. Their distressed state is believed to be reflected in their physical appearance--unkempt, scruffy, with torn and dirty clothes, and often with open sores or abscesses. For heavily addicted, debilitated drug users, the drug use replaces sexual pleasures. The combination of the intensive drug use and the physical deterioration lead to a loss of libido, and for many males, to a loss of the ability to perform sexually.

IV Drug Use and Long Term Relationships

Although there is a strong hedonistic component in the approach to sex among functional IV drug users that leads to many casual relationships, there is also a strong tendency to form long lasting sexual relationships. Contrary

to common perceptions, the life of an IV drug user is neither a rapid alternation between being stoned and being in withdrawal, nor a continuous decline from seeking sex for pleasure to being too strung out to enjoy sex. For many days and months there will be no drug injections, and for many other days and months the drug use will be modulated so that the user spends most of his or her time feeling normal. Although drug injection may be a recurring predominant theme in the person's life, it is not likely to be the only interest. They will have concerns for companionship, commitment, and having a family, even though drug use will often interfere with fulfilling these needs.

The great majority of IV drug users develop relatively stable relationships with a single partner. In one study conducted by the authors, male IV drug users entering treatment were asked about their "most recent primary sexual relationship" (Des Jarlais, et al., 1984A). Over ninety percent stated that they had a stable sexual relationship, and the average duration of these relationships was over five years. These relationships between IV drug users, or more frequently between a male IV drug user and a female who has never injected drugs, are not trouble-free; they suffer from economic difficulties as well as the considerable difficulties associated with IV drug use. The two partners often do not live together, and mutual monogamy is rare. A common pattern is for the male IV drug user to spend several nights per week with the non-injecting female partner, with her providing food and shelter and his occasionally bringing gifts. Despite these problematic issues, the relationships typically persist for long periods of time.

These relationships also frequently involve children. In one study of IV drug users in treatment, they averaged 2 children apiece (Deren, 1985). In addition, one-quarter of the subjects reported that they intended to have additional children, and another one- quarter were "not sure" if they wanted

to have additional children. Although IV drug users often intend to have children, and often are not certain whether they want additional children, deliberate planning for child bearing is rather rare. Much more common is a simple lack of any contraception.

Despite common perceptions to the contrary, the interpersonal commitment aspect of sexual relations is a strong part of sexual activity among IV drug users, and between IV drug users and persons who do not inject drugs. It is these long-term relationships that have the greatest potential for heterosexual transmission of HIV.

AIDS among the Sexual Partners of IV Drug Users

Table 1 (on following page) shows the cumulative numbers of cases of AIDS among heterosexual IV drug users and among "heterosexual contacts" in New York City (NYC Department of Health, personal communication, 1987). The "heterosexual contact" cases are those in which the index cases report no known risk factor for HIV infection other than having heterosexual activity with a person with AIDS or with a person known to be at high risk for AIDS.

In 88% percent of the 298 heterosexual contact cases, an IV drug user was reported as the likely source of HIV infection. Despite the presumably large number of HIV infected bisexual men in New York, IV drug users account for almost all of the domestic heterosexual transmission cases. All but 6 of these heterosexual contact cases have been male to female transmission. The 6 cases with female to male transmission have all been from a female IV drug user.

Long-term sexual relationships between IV drug users, and those between IV drug users and persons who do not inject drugs, have traditionally been subject to problems, many but not all of which were associated with the drug

use itself. Despite these problems these relationships usually lasted for relatively long periods of time and often produced children. With the AIDS epidemic, heterosexual and perinatal transmission of an often fatal virus has been added to these problems.

TABLE 1:Cases of AIDS in New York City

Year	Heterosexual IV Drug Users	Heterosexual Partners	Ratio
1980	6	0	-
1981	26	1	26.0:1
1982	136	9	15.1:1
1983	390	25	15.6:1
1984	881	55	16.0:1
1985	1682	117	14.4:1
1986	2719	214	12.7:1
1987	3997	318	12.6:1

The cumulative number of cases of AIDS among heterosexual IV drug users and among "heterosexual contacts" in New York City. These cases represent "domestic" heterosexual transmission of HIV. (They do not include immigrants from countries where heterosexual transmission is believed to be "the dominant source of HIV transmission", since those cases may represent transmission that occurred prior to immigration.)

In agreement with common perceptions, prostitution occurs frequently among IV drug users, though the actual behavior patterns may vary greatly from the media image of the prostitute driven by her addiction. Both male and female IV drug users may be involved in the exchange of sexual activity for money. Male IV drug users may participate in these sexual exchanges with other

men while retaining a self-definition as being "straights" (heterosexual in orientation). Maintaining this self-definition is usually dependent upon accepting money for the sexual activity--so that the IV drug user can define it as exploitation of the customer--and sometimes by restricting the particular sexual activities, usually to oral intercourse with the IV drug user as the insertive partner.

Female IV drug users will frequently engage in prostitution in order to obtain money for drugs. The common stereotype is of the female who becomes addicted and then must turn to prostitution in order to support her IV drug habit. This does occur, but is not the only relationship between prostitution and IV drug use. Female prostitutes will also often use drugs as a way of spending profits from their trade and/or as a form of self-medication for their stressful life style. Drug use is part of the environment in which much prostitution occurs. Thus, a prostitute who does not inject drugs will come to know persons who do and be offered opportunities to inject. Drug use does provide a way of spending money that provides intense and immediate gratification. It does not require the stable personal situation that would make delayed gratification consumption a rational economic decision.

A final aspect of the commercial sexual activity among IV drug users that should be noted is the frequent use of prostitutes by male IV drug users. As was mentioned at the beginning of this paper, the great majority of IV drug users are males, so that they tend to have their stable sexual relationships with females who do not inject drugs. Male IV drug users will often desire casual sex for pleasure, without the complications of a long-term relationship; and the long-term relationship may also be in a state of trouble in which sexual activity is not occurring. In these instances a male IV drug user will frequently turn to a prostitute for sex. If the female is also a

drug user, the exchange may be sex for drugs rather than sex for money. In these circumstances, there is the possibility that the exchange will be negotiated and defined as simple sharing of pleasures among friends rather than as prostitution.

AIDS among the Customers of IV Drug-Using Prostitutes

New York City would seem to have a very large potential for transmission of HIV from prostitutes to their customers. The virus has been present among IV drug users since at least 1977 (Des Jarlais, et al., 1987C). Studies of street prostitutes indicate that about half of them have histories of injecting drugs (Des Jarlais, et al., 1987C; Goldstein, 1979). (Workers in other forms of prostitution are likely to use illicit drugs, but are much less likely to inject drugs (Goldstein, 1979). The studies of HIV infection among IV drug using prostitutes in New York City indicate that at least half of them had been exposed to HIV by 1985 (Des Jarlais, et al., 1987C; Schoenbaum, et al., 1986; Wallace, et al., 1986).

Despite this large potential for transmission of HIV from IV drug-using prostitutes to their customers, the amount of transmission has been relatively slight. Studies of HIV infection among clients of sexually transmitted disease clinics do not find use of prostitutes to be a statistically significant risk factor for HIV infection (Rabkin, et al., 1986; Marmor, et al., 1987B; Chiasson, et al., 1987C). Of the first 12,180 cases of AIDS in New York City, only 22 cases have occurred in men who report contact with prostitutes as their only known risk behavior (Des Jarlais, et al., 1987C). (Because the man is not likely to know whether or not the prostitute injects drugs, these cases are recorded as "no identified risk" in the city.) This compares to 777 cases of AIDS among female IV drug users by the same date. A best estimate is that a

third of these female IV drug users-- 259--have practiced prostitution (Ginzburg, et al., 1986). Thus, the feared scenario of many IV drug using, HIV infected prostitutes' transmitting the virus to large numbers of customers does not appear to be happening.

One important reason for the currently low rate of transmission from IV drug-using prostitutes to their customers in New York City may be the frequent practice of "safer" sex within these exchanges. Over 90% of interviewed street prostitutes report that they "regularly" have their customers use condoms, and at least charge an extra fee if the customer does not want to use a condom (Des Jarlais, et al., 1987C). This use of condoms preceded concern about AIDS; it originated from concern about the economic consequences of contracting other sexually transmitted diseases. In addition, oral sex is by far the most common activity among street prostitutes and their customers in New York. Oral sex offers many practical advantages: it is relatively fast, does not require disrobing, and can be done in a truck cab, a car, or a doorway. Oral sex also appears to pose a very low risk of HIV transmission to the insertive partner (Detels, et al., 1983).

Although potential transmission of HIV from IV drug using prostitutes will require further monitoring, the New York City experience to date suggests that this transmission is very infrequent, at least if there is a high practice of "safer" sex techniques by the prostitutes and their customers.

AIDS Related Changes in Sexual Behavior among IV Drug Users

Concern about heterosexual transmission of AIDS has been increasing among IV drug users in New York City over the last several years. IV drug users were concerned about AIDS as early as 1983, learning about it primarily through the mass media and the oral communication networks of the IV drug use

subcultures. The concern about AIDS has grown with the still-increasing number of cases of AIDS among heterosexual IV drug users and among the non-drug injecting heterosexual partners of IV drug users. Knowledge of the heterosexual transmission of HIV has led to some sexual behavior changes among IV drug users.

One of the more important methods of spreading information about AIDS transmission, and of symbolizing the need for behavior change, has been the free distribution of condoms by drug abuse treatment programs in the city. In many methadone maintenance treatment programs, boxes of condoms are placed near the door, and anyone leaving the program can simply take as many as he or she wants. A substantial number of the condoms are taken from the methadone programs, many of these are sold in the streets. The methadone treatment staff are aware that many of the condoms are being re-sold, and do not object to this.

IV drug users in the city are now relatively well supplied with condoms. Many of the male IV drug users now carry condoms. The actual use of the condoms, however, depends greatly on the meaning of the sexual activity. The greatest changes have been reported in the areas of sex as pleasure and sex as commerce. Drug users have been reducing their numbers of casual sexual partners and increasing their use of condoms with casual partners. Male IV drug users have also changed somewhat in their use of prostitutes. They are more likely to use condoms when with a prostitute, more likely to select a "regular" prostitute for patronage rather than seeing many different prostitutes, and more likely to insist that the prostitute they use "look clean," well dressed, and in apparent good health.

It is when sexual activity implies long-term commitment that the authors have observed the least amount of AIDS-related behavior change. It appears very difficult to practice "safer sex" within such a relationship. These long-

term relationships have at least an implication of mutual monogamy. Use of condoms implies that one or both partners are not being faithful. These relationships are also characterized by some degree of mutual interdependence and conflict over IV drug use and other issues. The threat of also contracting AIDS may be too much to bear for many of these relationships, with the break-up of the relationship having significant costs for both partners.

Additional Special Issues for Future Concern

IV drug users are already the predominant source of heterosexual transmission of HIV in the United States and Europe. Up to now this transmission has been a gradual increase rather than the explosive spread that occurred through homosexual activity or through the sharing of drug injection equipment during the early part of the HIV epidemic. The most likely future spread of HIV from IV drug users will be a continuation of this gradual spread. There are several specific factors, however, that might lead to a more rapid heterosexual spread of HIV from IV drug users. The first factor is the potential that currently seropositive IV drug users may become more infectious as their HIV related immunosuppression increases. There are preliminary data indicating that HIV seropositives with hemophilia become more infectious as their immunosuppression increases (Goedert, et al., 1987). Since there are already a large number of asymptomatic HIV seropositive IV drug users in the United States and Europe, with difficulties in adopting consistent safer sex practices by IV drug users, there is a clear potential for greater heterosexual transmission if infectiousness should increase with increasing immunosuppression.

A second factor for concern is a potential relationship between the use of "crack" and heterosexual transmission of HIV. Crack is a potent form of cocaine that can be vaporized and then inhaled. It produces a very intense but

short lived euphoria--roughly equivalent to injecting cocaine--and can produce rapid dependence. Although the smoking of crack in itself does not lead to transmission of HIV, crack houses frequently become sites for prostitution; the males smoking crack may interpret the crack high as increasing their desire for sexual activity, and female crack users may be quite willing to exchange sex for additional crack. It is unknown whether crack house prostitution is more or less conducive to practicing safer sex; recently however, there has been an increase in heterosexual cases of syphilis in many large cities in the United States (Centers for Disease Control, personal communication, 1987), a phenomenon that may be related to crack house prostitution. (The authors are currently conducting research on this issue.) There is also the potential that syphilis might increase the infectivity of persons who have been exposed to HIV (Curran, et al., 1985), which could amplify the transmission of HIV.

A final concern about future heterosexual spread of HIV from IV drug users regards the sexual abuse/exploitation of young females by older males. With the weakening of the traditional family structure in many of the ethnic minority, low socio-economic status, high drug-use neighborhoods, a man living with a woman and children is likely to be a current boyfriend of the woman and not the biological father of the children. In this situation, if there is a young adolescent daughter in the family, the mother's boyfriend may initiate the daughter into sexual activity. There are not yet have enough data on how often this occurs, whether force and/or seduction is used, or the later consequences for the daughter. Information on this type of behavior is often hidden behind guilt, embarrassment, psychic pain, confusion of sexual identity, and anger. There are, however, examples of these events from therapy groups with IV drug users, and recently from AIDS prevention efforts.

The AIDS prevention example is worth presenting. One ex-addict street outreach worker was working with a group of female IV drug-using prostitutes. He was encouraging them to practice "safer" sex with their customers and to come in for counseling and possible HIV antibody testing. One of the members agreed to come in for counseling on the condition that the outreach worker arrange to have a social worker visit her mother and younger sister in an effort to stop the sexual abuse of her sister. It was her own sexual relationship with this man that led the female IV drug user to leave home. In further discussion with this group of 12 IV drug using prostitutes of which this woman was a member, 8 of the women reported that they had also been sexually used by a mother's boyfriend. They stated that, in their opinion, if they had been exposed to HIV, it was through this sexual abuse rather than by their own IV drug use or activities as prostitutes.

We want to emphasize that we do not yet have sufficient data on the frequency of this type of sexual behavior or any causal data on whether it leads to IV drug use and/or prostitution. Collecting data on this topic will not be easy. The highly private nature of the events make them difficult to discuss, and the emotionally charged nature requires that any investigator be able to provide some form of assistance for the emotional distress that may be provoked by discussing these types of events.

Despite the great uncertainties regarding this type of sexual abuse/exploitation, we believe that it has considerable potential relevance to the prevention of AIDS through heterosexual transmission. Clearly this type of situation is almost the opposite of the standard situation of two consenting adults rationally discussing AIDS, with the woman refusing to have sex unless the man agrees to use a condom. The standard AIDS educational materials may not be applicable to sexual situations where the woman has little or no power, and the behaviors are kept highly secret.

Summary

IV drug users have become the predominant source for heterosexual transmission of HIV in the United States. The heterosexual behavior of IV drug users is complex, and often does not conform to popular stereotypes of drug users. Functional IV drug users value sexual pleasure and will frequently engage in sexual activity both while using drugs and while not using drugs. Intense drug use--to the point of addiction and being "strung out"--will usually lead to a reduction in sexual activity. Both male and female IV drug users will engage in prostitution to obtain funds for drugs. Contrary to popular fears of prostitution-linked HIV transmission, there has been relatively little such transmission in the areas where it would be most likely to have occurred. This may be because of safer sex practices, such as condom use and oral sex.

IV drug users also form relatively permanent sexual relationships which typically involve a male IV drug user and a female who does not inject drugs. It is within these long-term relationships that heterosexual transmission of HIV is most likely. IV drug users frequently have children because they actively desire children and, to a lesser extent, because they do not consistently practice contraception.

Concerns about AIDS have led many IV drug users to change their sexual practices, including a reduction in the number of partners and increased use of condoms. Most of the AIDS risk reduction appears to be with casual partners, however, and not within the long-term relationships where heterosexual transmission is most likely.

The rate of heterosexual HIV transmission to date has been gradual in comparison to the very rapid transmission that occurred with male homosexual activity and through the sharing of drug injection equipment. Factors that

might lead to a rapid increase in heterosexual transmission in the future include infectiousness increasing with progressive immunosuppression, frequent unsafe sex associated with crack use, and prior exposure to syphilis.

REFERENCES

Angarano, G., Pastore G., Monno L., Santantonio, F., Luchera, N. and O. Schiraldi (1985). Rapid spread of HTLV-III infection among drug addicts in Italy. Lancet: p. 1302.

Biernachi, P. (1986). Pathways from heroin addiction: Recovery without treatment. Philadelphia: Temple University Press.

Bradburn, N.M., Rips, L.J. and S.V. Shevell (1987). Answering autobiographic questions: The impact of memory and inference on surveys. Science 263: pp 157-161.

Buning, E.C., van Brussel, G.H.A. and G. van Santen (in press). Amsterdam's drug policy and its implications for controlling needle sharing. In R Battjes and R Pickens (eds), Needle sharing among intravenous drug abusers: National and International Perspectives. Washington DC: National Institute on Drug Abuse Monograph.

Casadonte, P., Des Jarlais, D.C., Smith, T., Novatt, A. and P. Hemdal (1986, June). Psychological and Behavioral Impact of Learning HTLV-III/LAV Antibody Test Results [abstract]. Presented at the 2nd International Conference on Acquired Immunodeficiency Syndrome, p. 163. Paris, France.

Chaisson, R.E., Osmond, D., Moss, A.R., Feldman, H.W. and P. Bernacki (1987A). HIV, bleach and needle sharing [letter]. Lancet (1): p1430.

Chaisson, R.E., Moss, A.R., Onishi, R., Osmond, D. and J.R. Carlson (1987B). Human immunodeficiency virus infection in heterosexual intravenous drug users in San Francisco. American J Public Health 77: p. 169-72.

Chaisson, M.A., Fleisher, E., Petrus, D., and B. Miller (1987C). Epidemiological characteristics of women with AIDS in New York City [abstract]. The 3rd International Conference on AIDS, p. 174. Washington, D.C.

Coates, T.J., Staff, R.D. and C.C. Hoff (1988). Changes in sexual behavior of homosexual and bisexual men since the beginning of the AIDS epidemic. U.S. Congress, Office of Technology Assessment. Washington, DC.

Cox, C.P., Selwyn, P.A., Schoenbaum, E.E., O'Dowd, M.A. and E. Drucker (1986, June). Psychological and behavioral consequences of HTLV-III/LAV antibody testing and notification among intravenous drug abusers in a methadone program in New York City [abstract]. Presented at the 2nd International Conference on Acquired Immunodeficiency Syndrome, p 164. Paris, France.

Curran, J.W., Morgan, W.M., Hardy, A.M., Jaffe, H.W., Darrow, W.W., and W.R. Dowdle (1985). The epidemiology of AIDS: current status and future prospects. Science 229: pp. 1352-1357.

Deren, S. (1985). A description of methadone maintenance patients and their children. New York: New York State Division of Substance Abuse Services.

Des Jarlais, D.C., Friedman, S.R., Goldsmith, D. and W. Hopkins (In press). Heterosexual transmission of HIV from intravenous drug users: Regular partnerships and prostitution. In Voeller, B., Gottlieb, M. and J. Reinisch (eds), AIDS and sex: An integrated biomedical and biobehavior approach. Oxford University Press.

Des Jarlais, D.C. and S.R. Friedman (1987). HIV infection among intravenous drug users: Epidemology and risk reduction [review]. AIDS 1: pp 67-76.

Des Jarlais, D.C., Friedman, S.R., Marmor, M., Cohen, H., Mildvan, D., Yancovitz, S., Mathur, U., el-Sadr, W., Spira, T.J., Garber, J., et al. (1987A). Development of AIDS, HIV seroconversion, and potential co-factors for T4 cell loss in a cohort of intravenous drug users. AIDS 1(2): pp. 105-111.

Des Jarlais, D.C., Tross, S. and Friedman, S.R. (1987B). Behavioral Change in Response to AIDS. In G.P. Wozmeer, E. Bottone and R. Stahl (eds.), AIDS and Other Manifestations of Human Immunodeficiency Virus Infection. Park Ridge, NJ: Noyes Publications.

Des Jarlais, D.C., Wish, E., Friedman, S.R., Stoneburner, R., Yancovitz, S., Mildvan, D., El-Sadr, W., Brady, E., and M. Cuadrado (1987C). Intravenous drug use and heterosexual transmission of immunodeficiency virus: Current trends in New York City. New York State J Med: pp. 283-5.

Des Jarlais, D.C., Friedman, S.R. and D. Strug (1986). AIDS among Intravenous Drug Users: A Sociocultural Perspective. In D. Feldman and T Johnson (eds) The Social Dimensions of AIDS: Methods and Theory. New York: Praeger.

Des Jarlais, D.C., and W. Hopkins (1985). Free needles for intravenous drug users at risk for AIDS: Current developments in New York City [letter]. New England J Med 313: p. 1476.

Des Jarlais, D.C., Friedman, S.R. and W. Hopkins (1985). Risk reduction for the acquired immunodeficiency syndrome among intravenous drug users. Ann Intern Med 103: pp 755-759.

Des Jarlais, D.C., Chamberland, M.E., Yankovitz, S.R., Weinberg, P. and S.R. Friedman (1984A). Heterosexual partners: A large risk group for AIDS. Lancet 8415: pp. 1346-7.

Des Jarlais, D.C., Marmor, M., Thomas, P. and M.E. Chamberland (1984B). Kaposi's sarcoma among four different AIDS risk groups. N Engl J Med 310: p 1119.

Detels, R., Fahey, J.I., Schwartz, K., Greene, R.S., Visscher, B.R., and M.S. Gottleib (1983). Relation between sexual practices and T-cell subsets in homosexually active men. Lancet Mar 19: pp. 609-611.

Flynn, N.M., Jain, S., Harper, S., Bailey, V., Anderson, R. and G. Acuna (1987, June). Sharing of Paraphernalia in intravenous drug users (IVDU): Knowledge of AIDS is incomplete and doesn't affect behavior [abstractl. Presented at the 3rd International Conference on AIDS, p. 93. Washington, D.C.

Friedman, S.R., Des Jarlais, D.C., Sotheran, J.L., Garber, J., Cohen, H. and D. Smith (1987). AIDS and self-organization among intravenous drug users. International J Addictions 22: pp 201-220.

Ginzburg, H.M., French, J., Jachson, J., Hartsock, P.I., MacDonald, P.I. and S.H. Weiss (1986). Health education and knowledge assessment of HTLV-III diseases among intravenous drug users. Health Education Quarterly; 13(4): pp. 373-382.

Goedert, J.J., Eyster, M.E. and Biggar, R.J. (1987). Heterosexual transmission of human immunodeficiency virus (HIV): Association with severe T4 cell depletion in male hemophiliacs [abstract]. The 3rd International Conference on AIDS, p. 106. Washington, D.C.

Goldstein, Paul J. (1979). Prostitution and Drugs. Lexington, MA: Lexington Books.

Jackson, J. and L. Rotkiewicz (1987, June). A coupon program: AIDS education and drug treatment [abstract]. Presented at the 3rd International Conference on AIDS, p 156. Washington D.C.

Johnson, B.D., Goldstein, P.J., Preble, E., Schmeidler, J., Spunt, B. and T. Miller (1985). Taking Care of Business: The Economics of Crime by Heroin Abusers. Lexington, Massachussetts: D.C. Health and Company.

Kleinman, P.H., Friedman, S.R., Mauge, C.E., Goldamith, D.S., Des Jarlais, D.C. and W. Hopkins (1987). Beliefs and behaviors regarding AIDS: A survey of street intravenous drug users. [abstract] Presented at the 3rd International Conference on AIDS, p 196. Washington D.C.

Marlink, R.G., Foss, B., Swift, R., Davis, W., Essex, M., J. Groopman, et al. (1987, June). High rate of HTLV-III/LAV exposure in IVDA's from a small-sized city and the failure of specialized methadone maintenance to prevent further drug use [abstract]. Presented at the 3rd International conference on AIDS, p 156. Washington, D.C.

Marmor, M., Des Jarlais, D.C., Cohen, H., Friedman, S.R., Beatrice, S.T., Dubin, N., El-Sadr, W., Mildvan, D., Yancovitz, S., Mathur, U. and R. Holzman (1987A). Risk factors for infection with human immunodeficiency virus among intravenous drug abusers in New York City. AIDS (1): pp. 39-44.

Marmor, M., Sanchez, M., Krasinski, K., Cohen, H., Bartelme, S., Weiss, L.R., et al. (1987B). Risk factors for human immunodeficiency virus (HIV) infection among heterosexuals in New York City [abstract]. The 3rd International Conference on AIDS, p. 122. Washington, D.C.

McAuliffe, W.E., Doering, S., Breer, P., Silverman, H., Branson, B. and K. Williams (1987, June). An evaluation of using ex-addict outreach workers to educate intravenous drug users about AIDS prevention [abstract]. Presented at the 3rd International Conference on AIDS, p 40. Washington, D.C.

Novick, D.M., Kreek, M.J., Des Jarlais, D.C., Spira, T.J., Khuri, E.T., Ragunath, J., Kalyanaraman, V.S., Gelb, A.M. and A. Miescher (1985). Abstract of clinical research findings: Therapeutic and historical aspects. In L.J. Harris (ed). Problems of Drug Dependence 1985: Proceedings of the 47th Annual Scientific Meeting. the Committee of Problems on Drug Dependence, Inc. pp. 318-320. Rockville, MD: National Institute on Drug Abuse, NIDA Research Monograph 67.

Office of Technology Assessment (1987, May). The cost of AIDS and other HIV infections: Review of the estimates. Washington, D.C.: U.S. Congress.

Rabkin, C.S., Thomas, P.A., Jaffe, H.W. and S. Schultz (1986). Prevalence of antibody to HTLV-III in a population attending a sexually transmitted disease clinic. JAMA 255: pp. 2167-2172.

Robertson, J.R., Bucknall, A.B.V., Welsby, P.D., Roberts, J.J.K., Inglis, J.M., Peutherer, J.F. and R.P. Brettle (1986). Epidemic of AIDS related virus (HTLV-III/LAV) infection among intravenous drug users. British Medical J 292: pp. 527-529.

Robertson, J.R., Skidmore, C.A. and J.J.K. Roberts (in press). HIV infection in intravenous drug users: A follow up study indicating changes in risk taking behavior. British J Addiction.

Schoenbaum, E.E., Selwyn, P.A., Klein, et al., (1986). Prevalence of and risk factors associated with HTLV-III/LAV antibodies among intravenous drug abusers in methadone clinics in New York City [abstract]. The 2nd International Conference on AIDS, p. 111. Paris, France.

Selwyn, P.A., Feiner, C., Cox, C.P., Lipshultz, C. and R.L. Cohen (1985). Knowledge about AIDS and high-risk behavior among intravenous drug abusers in New York City. AIDS 1(4): pp 247-254.

Selwyn, P.A., Schoenbaum, E.E., Hartel, D., Petersvan, T., Klein, R.S. and G.H. Friedland (1987, June). Natural history of HIV infection in intravenous drug abusers (IVDA's). Presented at the 3rd International Conference on AIDS, p 2. Washington, D.C..

Senie, R., et al. (1987, August). AIDS risk reducation study-interum methadone clinic. Presented at the 11th Scientific Meeting of the International Epidemological Association. Helsinki, Finland.

Simpson, D.D., Savage, J.L. and S.B. Sells (1978). Data book on Drug Treatment Outcomes: Followup Study of 1969-1972 Admissions to the Drug Abuse Reporting Program (DARP) (Report 78-10). Fort Worth, TX: Institute of Behavior Research, Texas Christian University.

Van Den Hoek, J.A.R., Coutinho, R.A., Van Zadelhoff, A.W., Van Haas-Trecht, H.J.A. and J. Goudsmit (1987, June). Prevalence, incidence and risk factors of HIV infection among drug users in Amsterdam [abstract]. The 3rd International Conference on AIDS, p 69. Washington, D.C.

Wallace, J.I., Christonikos, A.B., Marlink, R., Guroff, M.R. and S. Weiss (1986). HTLV-III/LAV exposure in New York City prostitutes [abstract]. The 2nd International Conference on AIDS, p. 120. Paris, France.

Watters, J.K. (1987). Preventing human immunodeficiency virus contagion among intravenous drug users: The impact of street-based education on risk-behavior [abstract]. The 3rd International Conference on AIDS, p. 60. Washington, D.C.

Weiss, S.H., Ginzberg, H.M., Goldert, J.J., Biggar, R.T., Mohica, B.A. and Blattner, W.A. et al. (1985). Risk for HTLV-III exposure and AIDS among perenteral drug abusers in New Jersey [abstract]. Presented at the 1st International Conference on Acquired Immune Deficiency Syndrome, p 44. Atlanta, GA.

Wikler, A. (1973). Dynamics of drug dependence: Implications of a conditioning theory for research and treatment. Arch Gen Psychiatry 28: pp 611-616.

Wilson, William J. (1987). The Truly Disadvantaged. Chicago: University of Chicago Press.

Winkelstein, W., Samuel, M., Padian, N., Wiley, J., Lang, W., Anderson, R.E. and J.A. Levy (I987). The San Francisco men's health study: III reduction in human immuniodeficiency virus transmission among homosexual/bisexual men, 1983-86. Am J Public Health 77: pp 685-689.